CONNECTICUT RIVER FLOOD CONTROL

FARMINGTON RIVER BASIN

SUCKER BROOK
DAM AND RESERVOIR

SUCKER BROOK, CONNECTICUT

DESIGN MEMORANDUM NO. 6
SITE GEOLOGY

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND

CORPS OF ENGINEERS WALTHAM, MASS.

OCTOBER 1965

R/18 NOV 65 [illegible]

ENGCW-EZ (18 Oct 65) 1st Ind
SUBJECT: Sucker Brook Dam and Reservoir, Sucker Brook, Connecticut River Basin, Connecticut - Design Memorandum No. 6, Site Geology

DA, CofEngrs, Washington, D. C., 20315, 15 November 1965

TO: Division Engineer, New England Division

Approved.

FOR THE CHIEF OF ENGINEERS:

C. E. Slayton

wd Incl

for WENDELL E. JOHNSON
Chief, Engineering Division
Civil Works

U. S. ARMY ENGINEER DIVISION. NEW ENGLAND
CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM. MASS. 02154

ADDRESS REPLY TO:
DIVISION ENGINEER

REFER TO FILE NO. NEDED-D

18 October 1965

SUBJECT: Sucker Brook Dam and Reservoir, Sucker Brook, Connecticut River Basin, Connecticut - Design Memorandum No. 6, Site Geology

TO: Chief of Engineers
ATTN: ENGCW-E

In accordance with EM 1110-2-1150, there is submitted, for your review and approval, Design Memorandum No. 6, Site Geology, for the Sucker Brook Dam and Reservoir, Sucker Brook, Connecticut River Basin, Connecticut.

FOR THE DIVISION ENGINEER:

John Wm Leslie

Incl (10 cys)
Des Memo No. 6

JOHN Wm. LESLIE
Chief, Engineering Division

SUCKER BROOK DAM AND RESERVOIR
SUCKER BROOK
CONNECTICUT RIVER BASIN
CONNECTICUT

DESIGN MEMORANDA INDEX

No.	Title	Date Submitted	Date Approved
1	Hydrology	24 Jun 64	28 Jul 64
2	General Design - Sucker Brook Dam and Reservoir	30 Apr 65	23 Jun 65
3	Hydraulic Analysis	30 Apr 65	10 Jun 65
4	Detailed Design of Structures	10 Aug 65	
5	Concrete Materials	28 Aug 64	22 Sep 64
6	Site Geology	18 Oct 65	
7	Real Estate - Sucker Brook Dam and Reservoir	9 Jul 65	25 Aug 65
8	Embankments and Foundations		
9	General Design - Highland Lake Dam Modifications		
10	Real Estate - Highland Lake Dam		

SUCKER BROOK DAM AND RESERVOIR

SUCKER BROOK

CONNECTICUT RIVER BASIN

CONNECTICUT

DESIGN MEMORANDUM NO. 6

SITE GEOLOGY

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SUCKER BROOK DAM AND RESERVOIR

SUCKER BROOK

CONNECTICUT RIVER BASIN

CONNECTICUT

DESIGN MEMORANDUM NO. 6

SITE GEOLOGY

A. REGIONAL GEOLOGY AND TOPOGRAPHY.

1. The Sucker Brook Dam site is located in Western Highlands of Connecticut, a rugged, maturely dissected region of moderate relief underlain by crystalline rocks. It is a region of rough, irregular ridges and relatively deep, steep-sided valleys. Glaciation has modified the rough topography by rounding and smoothing the crests of the bedrock hills and ridges, steepening some of the valley walls, and filling the valley bottoms. A generally thin mantle of till covers the hills and ridges between extensive areas of exposed bedrock. The valley bottoms are deeply filled by till and thick deposits of outwash which form relatively wide, flat flood plains and extensive terraces along the lower valley slopes. Where not masked by till or terraces, numerous and persistent outcrops of bedrock occur along the flanks of the hills. In the valleys present streams, raised by the glacial filling high above their old channels, have uncovered bedrock in many areas. The bedrock of the region consists mainly of complexly folded schists, gneisses and granitic rocks. The folds trend generally north-south.

B. LOCATION AND DESCRIPTION OF SITE.

2. The damsite is located on Sucker Brook approximately 400 feet upstream from its confluence with Highland Lake and approximately 2 miles southwest of Winsted, Connecticut. As shown on Vicinity Map, Plate No. 6-1, access to the site is available on Wakefield Boulevard, a hard surfaced road which runs along the western shore of Highland Lake from Winsted, Connecticut. At the site, Sucker Brook flows along the southwest side of a wide, marshy, flat-bottomed valley occupied by an abandoned race track. The valley is constricted at the site by the steep-faced ridge which slopes down to the shores of Highland Lake and forms the left abutment of the dam. The spillway is sited on a gently sloping bench on the nose of this ridge. The right abutment rises abruptly from the valley bottom in a steep slope which extends far above top of dam. Both abutments are thickly wooded and the valley bottom is densely overgrown by brush and small trees.

C. SURFICIAL AND SUBSURFACE INVESTIGATIONS.

3. Investigations of survey report scope were initiated at the site in 1957. Four foundation test borings were completed during this stage of the investigations and the results were presented in Interim Report on Review of Survey, Farmington River Basin, dated December 1958. Investigations for preparation of final design were resumed in May 1964 and a foundation exploration program consisting of thirty-seven borings was completed. One 5-inch diameter boring was also completed to obtain undisturbed samples for laboratory testing of the silt which occurs under the upstream part of the dam foundation in the valley bottom. The locations of all explorations at the damsite are shown on Plan of Foundation Explorations, Plate No. 6-2.

4. Explorations to locate a source of impervious material were made in a large deposit of glacial till located in Area A shown on Vicinity Map, Plate No. 6-1. As shown on Plan of Borrow Explorations, Plate No. 6-7, seven borings and two test pits were completed in the area to determine the character and extent of material available and to obtain samples for laboratory tests.

5. All borings were continuously drive-sampled in overburden and rock when encountered, was diamond-drill cored generally to a minimum penetration of 20 feet. Descriptions and detailed classifications of materials encountered in all explorations are presented in Records of Foundation Explorations, Plates Nos. 6-4 to 6-6, and Records of Borrow Explorations, Plate No. 6-8.

D. SURFICIAL GEOLOGY.

6. The wide valley of Sucker Brook, a broad, flat-bottomed re-entrant in the till-covered bedrock hills along the west side of Highland Lake, is floored generally with sand and gravelly sand. Locally, superficial deposits of organic materials have accumulated in low sags in the valley bottom. Bedrock consisting of gneiss, outcrops on the valley floor in two areas adjacent to the junction of Sucker Brook Road and Wakefield Boulevard and high above the spillway channel on the left abutment. The left abutment rises abruptly from the valley and is blanketed with thin, variable deposits of outwash and modified till. The overburden on the steep right abutment is sandy till.

E. FOUNDATION CONDITIONS.

7. Overburden. The overburden in the valley bottom consists generally of sandy, modified till overlain by stratified and lensed outwash and lake deposits. As shown on centerline section, Geologic Log Sections, Plate 6-3, the overburden in the valley bottom ranges in thickness from 20 feet to more than 30 feet. The till extends downward along the bedrock surface from the abutments to the middle of the valley where it appears to be discontinuous locally and outwash or lake deposits rest directly on the bedrock. Except where entirely absent as at boring FD-33, the till ranges in thickness from approximately 10 feet on the left side of the valley bottom to more than 20 feet near the bottom of the right abutment. The till consists generally of variable, silty, gravelly sand and silty, sandy gravel with cobbles and boulders. Upstream from the centerline of dam, the till is overlain throughout most of the valley botrom by stratified silt apparently deposited in ponded or very sluggishly flowing water. Near the center of the valley, adjacent to boring FD-26, the silt is over 20 feet thick but lenses out laterally against the rising till and bedrock slopes approaching the valley sides. The silt also thins out toward the centerline of the dam against the rising till or outwash-covered bedrock surface. The silt was encountered in a bed ranging in thickness from 8 to 11 feet at the centerline of dam in borings FD-31 and FD-40 where it rests on a thin zone of stratified fine sand and silty sand above the till. The silt appears downstream from the centerline of dam in thin beds occurring in silty sand strata near the right side of the valley. The silt where present, and elsewhere the till, are overlain by variable, stratified deposits consisting of silty sands and gravelly sands. These coarser materials apparently were deposited largely by meltwater streams which were flowing into the shoaling pond and in many areas appear to be wide channel fillings deposited in streams flowing on the older lake beds. The finer, silty sands occur mainly in the upstream part of the foundations where the valley widens. These silty sands are approximately 20 feet thick near the middle of the valley and like the underlying silt, thin out against the rising till and bedrock slopes on the valley sides. The gravelly sands occur predominantly at and downstream from the centerline of dam and range in thickness from 10 to more than 25 feet. Superficial organic deposits occur locally in low sags in the valley floor in the upstream part of the foundation. The overburden on both abutments is mainly sandy, modified till consisting of silty, gravelly sand. On the left abutment, the till is generally thin ranging from 5 to 15 feet in thickness and is overlain by scattered, local deposits of outwash sands and gravelly sands. The till on the right abutment is approximately 20 feet thick at and downstream from centerline of dam but thickens upstream to more than 30 feet. Scattered boulders occur in and on the till on both abutments.

8. Bedrock. Bedrock as shown on Plan of Exploration, Plate 6-2, outcrops in the valley bottom near the junction of Wakefield Boulevard and Sucker Brook Road and high on the left abutment above the spillway channel. Bedrock exposed in the outcrops and as shown by rock cores from borings, consist mainly of granitic gneiss with local zones of granite and schist. The gneiss is quite variable ranging from light and dark gray to gray and pink. Much of the gneiss is typically granitic, hard and generally fine-grained with obscure or poorly developed foliation. In many areas, however, the gneiss is coarse-grained with thick biotite laminae in very well-developed but strongly contorted foliations. The granite which cuts through the gneiss in random irregular masses, dikes and thin stringers is also quite variable ranging from normal, fine-grained granite, to coarse pegmatite. The schist, mainly quartz-biotite, occurs largely as gradational phases of the gneiss but locally schist inliers with sharp contacts are found. Although some of the schist is fine-grained and relatively hard, it is predominantly coarse and soft with thick zones of felted biotite. Foliation of the gneiss and schist has a general north-south trend but locally both the trend and dip of the foliation is variable and contorted. The bedrock surface is characteristically irregular with numerous troughs and hollows between abrupt ribs and knobs. Weathering has commonly progressed throughout most of the rock along closely-spaced high and low angle joints to depths of more than 20 feet and along more widely scattered joints and open foliation planes in local areas to depths up to 50 feet. Mud seams and weathered zones in schist or schistose phases of the gneiss were encountered in some of the borings to depths of 30 feet. Borings FD-16 and FD-41, located in centerline of dam near the bottom of the right abutment, encountered badly broken and weathered rock as shown on Geologic Log Section, Plate 6-3. In boring FD-16, although weathered rock occurred from approximately 26 feet to 31 feet, total loss of rock core in drilling from 31 feet to 38 feet indicates a very soft and weathered zone. Below this zone the rock is very badly broken by closely-spaced, weathered joints and open foliation planes to a depth of 65 feet. Similarly in boring FD-41 where rock was encountered at a depth of 26 feet, very poor core recovery and the badly broken and weathered condition of the core indicates that the rock is very badly weathered to a depth of 46 feet and although less weathered below, the rock is very badly broken by close joints to the full depth of the hole at 68 feet. Another area of very badly weathered rock was encountered in the spillway discharge channel at borings FD-12 and FD-20 as shown on Geologic Log Section, Plate 6-3. The weathered zone consists of very soft, decomposed and completely disintegrated schist which extends to a depth of approximately 28 feet. This weathered zone is apparently of very limited lateral extent, however, because it was not encountered in borings FD-29 and FD-30.

F. SUBSURFACE WATER.

9. Level of subsurface water, as indicated by observation of water levels in borings during drilling, are generally at or below the rock surface on the abutments. Seasonal run-off may be concentrated locally at the rock surface, however, or trapped in troughs and hollows in the rock. In the valley bottom, groundwater levels are essentially controlled by the level of Highland Lake.

G. RESERVOIR LEAKAGE.

10. The entire reservoir is inclosed by very high, wide, bedrock hills and ridges generally blanketed with till so that there is no possibility of leakage through low or pervious divides.

H. CONSTRUCTION MATERIALS.

11. General. Design of the embankment has not been finalized because investigations are still in progress. Although investigations to locate sources of borrow materials are complete, studies are in progress to determine the characteristics of some of the foundation materials and the type and quantities of materials which will be available from required excavations. Generally, however, the embankment will be of the zoned type with cutoff to rock and will include zones of impervious and random materials with suitable filter and drainage features and rock slope protection.

12. Impervious Material. Glacial till is available in a large area on the hill immediately above the right abutment of the dam. This area, designated Area A, is shown on the Vicinity Map, Plate 6-1. Seven test borings and two large, machine-excavated test pits were completed in the area as shown on Plan of Borrow Exploration, Plate 6-7. The till consists generally of gravelly, silty, clayey sand and gravelly, silty sands with scattered cobbles and boulders throughout. The till is overlain in some parts of the area by 5 feet to 8 feet of silty sands, sandy silt and silty, sandy gravel. The borings indicate that the thickness of the till in the area ranges from 12 feet to more than 75 feet and, in general, is more than 40 feet thick.

13. Random Materials. The materials from required overburden excavations are variable and overall may be considered random type fill. In the valley bottom and the lower part of the spillway discharge channel, the material from excavations consists of sandy silt, silty and fine to medium sands, gravelly sands and silty sandy gravels. On the abutments and in most of the spillway channel, the overburden consists mainly of variable, gravelly, silty sand.

14. Drainage Materials and Gravel Bedding. There are no economically feasible sources of pervious materials suitable for drainage features in the embankment or gravel for gravel bedding within the reservoir limits. There are no undeveloped sources of suitable materials available within a reasonable haul distance from the site. There are, however, several commercial sources of these materials within 10 mile haul distance. Considering the relatively small quantities required, it is planned that materials for drainage features and gravel for gravel bedding will be obtained from commercial sources.

15. Rock Slope Protection and Riprap. Rock from spillway and outlet excavations and boulders from required excavations will be available for slope protection and riprap. Although there are some areas of schist, which locally is badly weathered, the rock is mainly granite gneiss and overall is fresh and durable. The excavations in rock, however, are relatively shallow and will be largely in rock which is broken by closely-spaced, weathered joints and dirt-filled seams. Much of the rock will break to small sizes and the blasted rock will contain a high proportion of dirt and fines. Particularly in the schistose areas, micaceous fines will be produced and in the areas of weathered schist, the excavated material will be largely wasted. It is expected that wasting and high losses in blasting and handling will offset bulking of the blasted rock.

16. Concrete Aggregates. In view of the small quantity of concrete required, investigation of sources of aggregate materials has been limited to consideration of commercial sources. Investigations of aggregate materials made in connection with other recent flood control projects in the near vicinity indicate that satisfactory materials are available from several commercial sources within twenty-five (25) mile haul distance of the site. Complete data on testing of concrete aggregates is presented in Design Memorandum No. 5, Concrete Materials, Sucker Brook Dam, submitted on 28 August 1964 and approved 22 September 1964.

I. CONCLUSIONS AND RECOMMENDATIONS.

17. Geologic conditions at the site and within the reservoir are generally favorable for construction of the proposed dam and appurtenant structures. All geological factors relative to foundations, excavations, leakage and natural borrow materials are being considered in preparation of designs and specifications. Although no major problems concerning engineering geology are anticipated during construction, a digest of geologic factors involved in design and construction will be prepared for the information and guidance of field construction personnel. The digest will also direct attention to the availability of division geologists for consultation during construction regarding phases of the work which involves geology.

18. Bedrock is available for cutoff at depths of approximately 20 feet or less on the left side of the valley and in the abutments. On the right side of the valley, the bedrock is 25 feet to 30 feet in depth except in the vicinity of borings FD-16 and FD-41 where badly weathered and broken rock was encountered. The weathered rock surface was encountered at a depth of 26 feet but badly weathered, closely broken rock which cannot be successfully grouted extends to a depth of at least 50 feet. Removal of a large part of this rock will be required to obtain satisfactory foundation and cutoff.

19. A grout curtain will be constructed beneath the cutoff for the dam and at the outlet conduit and spillway walls and weir to assist in control of seepage. Drain holes will be provided as required beneath structures, walls and slabs. Rock in rock foundations for concrete structures is hard, sound and satisfactory for foundation for heavy structural loads.

20. The very general north-south trend of the bedrock structure intersects the alignment of the outlet conduit and the upper part of the spillway at about 45° and is roughly parallel to most of the spillway discharge channel. The great local variations in trend and the erratic pattern of foliation in the bedrock, however, make the orientation of structure alignment and bedrock structure of only general significance. It should also be noted that all excavations in rock are less than 20 feet in depth below the rock surface. Although design side slopes of 4 on 1 in rock are considered reasonable, the variable character of the rock and the relatively shallow depth of excavations which will be largely in rock with weathered, close joints and seams, will result in fall-outs and considerable overbreak. For the same reasons, presplitting will not be any more effective than normal close-drilling in control of side slopes. Line drilling will be specified locally for shaping final structure excavations. Thorough and judicious scaling will be required during progress of excavations to minimize ravelling and fall-out and rock bolts will be utilized where applicable. It is expected that schist, weathered essentially to the consistency of soil, will be encountered in side slopes of excavations at the lower end of the spillway discharge channel. Side slopes in this short reach will be adjusted as necessary during construction and slopes of 1 on 2 will be used for estimates.

21. Rock from excavations and boulders from required excavations will be suitable for use as rock slope protection and riprap. Because of the local areas of weathered rock and the numerous, weathered, close joints and dirt-filled seams in the otherwise fresh rock, however, it is expected that the blasted rock will contain a large percentage of fines. Segregation and

wasting of dirty rock would be a difficult problem of field control and loss in total volume of usable rock would probably not be within tolerable limits. It is considered necessary, therefore, that the rock be processed over a grizzly to remove surplus fines. It is estimated that the rock will bulk by a factor of 1.4 over in situ volume. Losses incurred in blasting and handling will largely offset bulking and it is considered that, with processing, a 1 to 1 factor of the in situ volume could be used for estimates. If additional rock is required, a few thousand yards could be obtained by excavations in the bottom and along the up-hill side of the spillway approach channel. If larger quantities of rock are needed, it could be obtained by quarrying in the steep hillside immediately adjacent to the northwest side of the impervious borrow area, Area A.

CORPS OF ENGINEERS U.S. ARMY

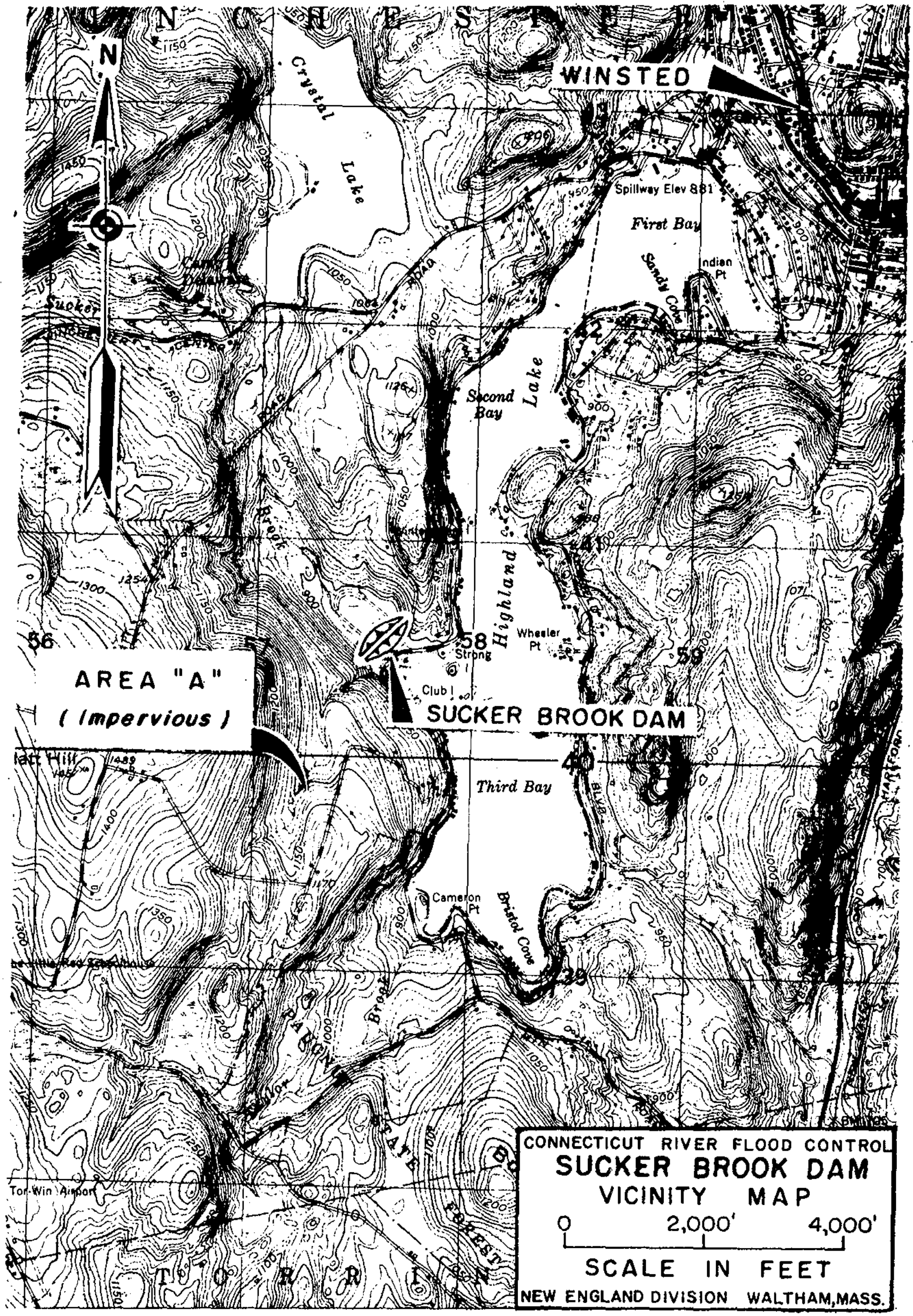
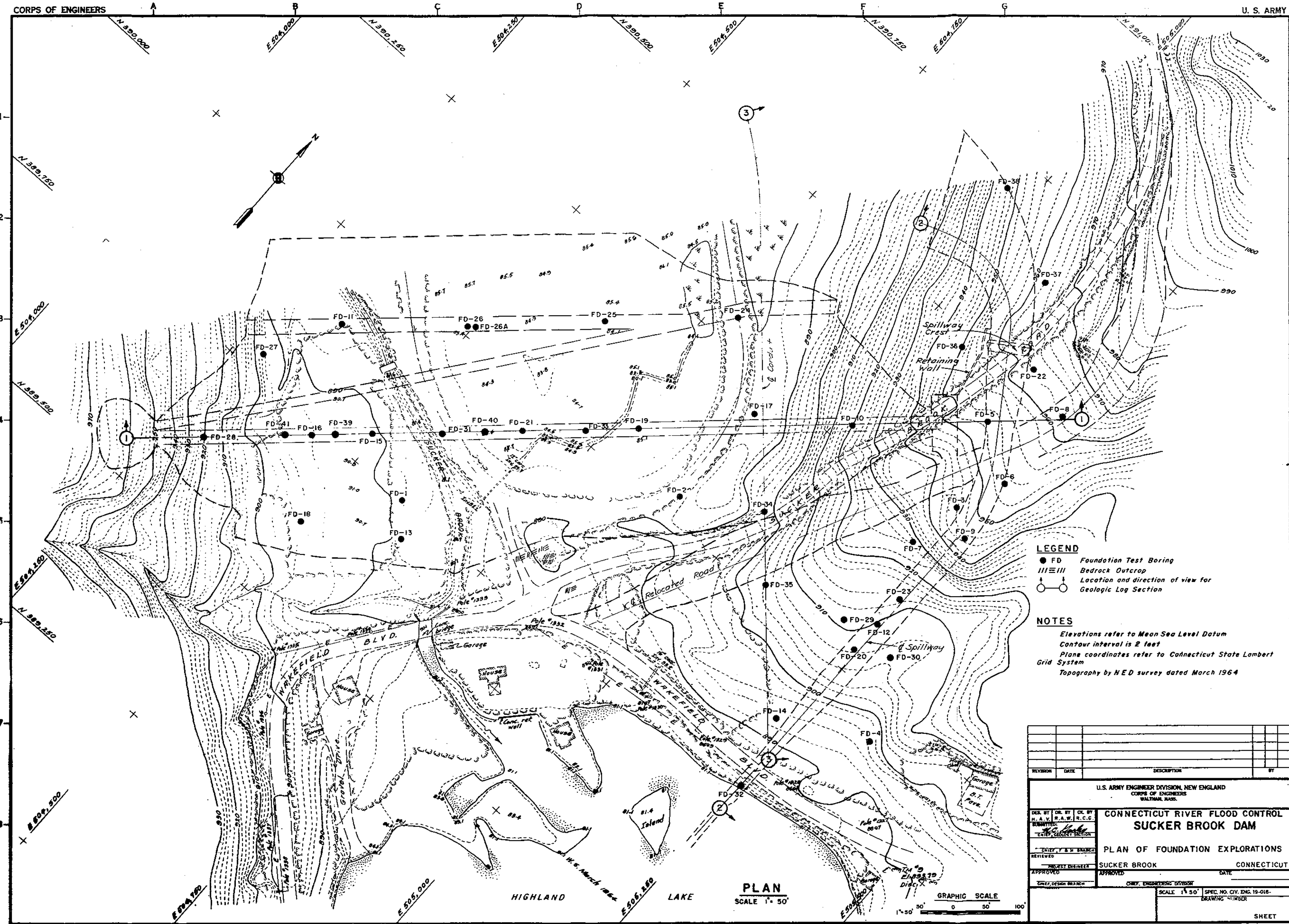


PLATE NO. 6 - 1



CORPS OF ENGINEERS
U. S. ARMY
PLAN
SCALE 1" = 50'
GRAPHIC SCALE
HIGHLAND
LAKE
E. WAKEFIELD BLVD.
Relocated Road
Spillway Crest
Retaining Wall
Spillway
Island
Garage
House
FD-1
FD-2
FD-3
FD-4
FD-5
FD-6
FD-7
FD-8
FD-9
FD-10
FD-11
FD-12
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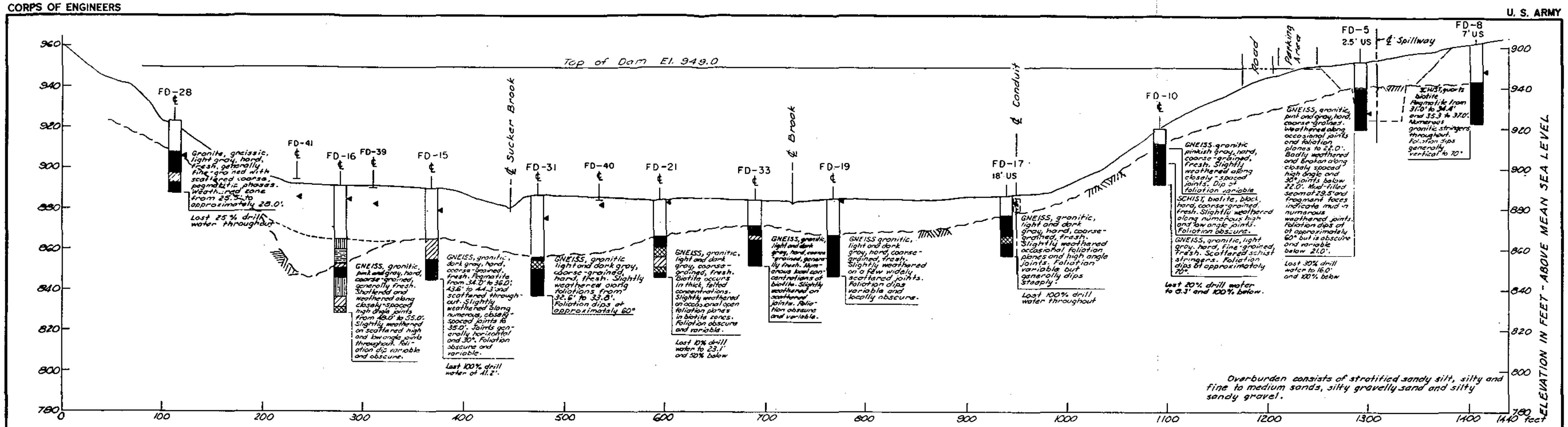
FD-29
FD-30
FD-31
FD-32
FD-33
FD-34
FD-35
FD-36
FD-37
FD-38
FD-39
FD-40
FD-41
LEGEND
FD Foundation Test Boring
Bedrock Outcrop
Location and direction of view for Geologic Log Section
NOTES
Elevations refer to Mean Sea Level Datum
Contour interval is 2 feet
Plane coordinates refer to Connecticut State Lambert Grid System
Topography by N E D survey dated March 1964
REVISION
DATE
DESCRIPTION
BY
U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.
DES. BY H. A. V.
DR. BY R. A. W.
CK. BY R. C. C.
SUBMITTED:
CHIEF, GEOLOGY SECTION
CHIEF, F & M BRANCH
REVIEWED
PROJECT ENGINEER
APPROVED
CHIEF, DESIGN BRANCH
CONNECTICUT RIVER FLOOD CONTROL
SUCKER BROOK DAM
PLAN OF FOUNDATION EXPLORATIONS
SUCKER BROOK
CONNECTICUT
APPROVED
DATE
CHIEF, ENGINEERING DIVISION
SCALE 1" = 50'
SPEC. NO. CIV. ENG. 19-016-
DRAWING NUMBER
SHEET

PLATE 6-2

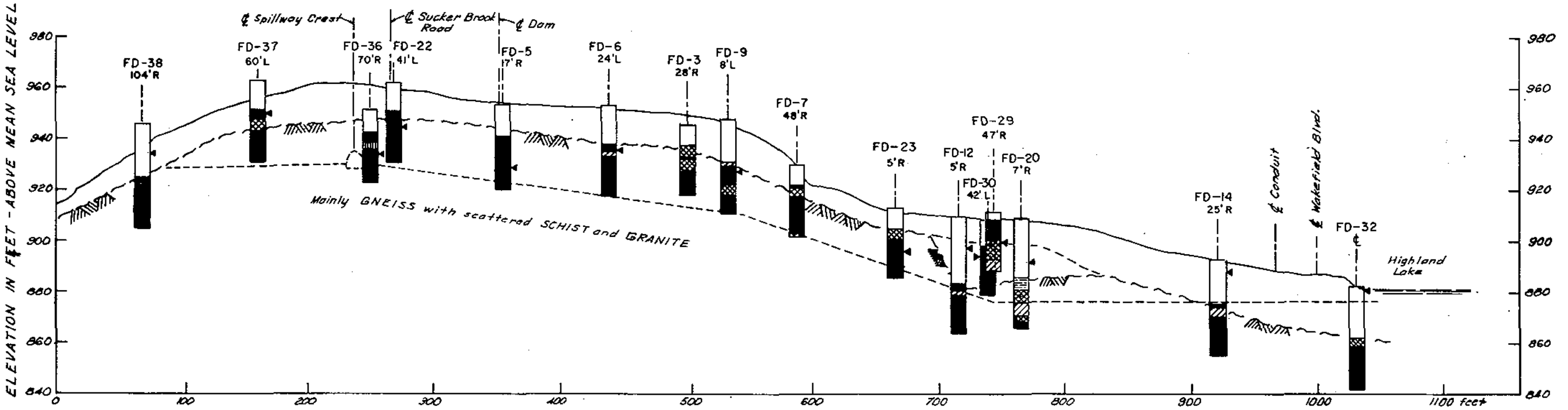
CORPS OF ENGINEERS

U. S. ARMY



SECTION 1-1 ℄ DAM

LOOKING UPSTREAM



SECTION 2-2 ℄ SPILLWAY

LEGEND

FD-

Overburden

Subsurface water level during exploration

Cobbles or boulders

Core Recovery (Usually 2⅛" diameter)

0 - 25%

25 - 50%

50 - 75%

75 - 90%

90 - 100%

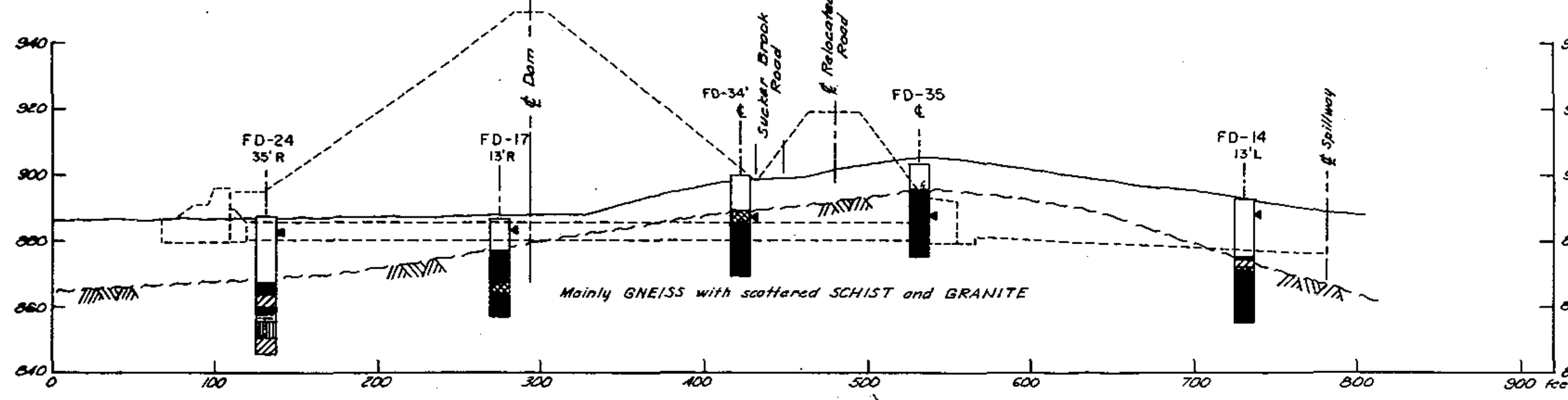
Assumed Sound Bedrock Surface.

Assumed Weathered Bedrock Surface.

NOTES

For location of sections see Plate No. 6-2

For detailed Records of Explorations see Plates 6-4 to 6-6



SECTION 3-3 ℄ CONDUIT

REVISION	DATE	DESCRIPTION	BY

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

DES. BY H.A.V. | DR. BY R.D.B. | CK. BY R.C.B.

SUBMITTED: CHIEF, GEOLOGY SECTION

REVIEWED: CHIEF, F.&M. BRANCH

PROJECT ENGINEER

APPROVED: CHIEF, DESIGN BRANCH

CONNECTICUT RIVER FLOOD CONTROL

SUCKER BROOK DAM

GEOLOGIC LOG SECTIONS

SUCKER BROOK | CONNECTICUT

APPROVED | DATE

CHIEF, ENGINEERING DIVISION

SCALE

SPEC. NO. CIV. ENG.-19-016

DRAWING NUMBER

SHEET

PLATE 6-3

CORPS OF ENGINEERS

U. S. ARMY

FD-1
22 OCT 1957
EL. 890±

- 4 — TOPSOIL (FILL)
- 14 SM — Silty SAND
- 24 SP-SM — Silty SAND
- 17 SP — Medium to fine SAND
- 21 SP — SAND with cobbles
- 100+ SM — Silty, gravelly SAND (TILL)
- El. 861±
- GNEISS, granitic, dark gray, coarse-grained with scattered fine-grained phases. Generally unweathered except for weathering along numerous closely-spaced joints and foliation planes. Foliation dips from 80° to vertical.
- El. 841±

FD-2
28 OCT 1957
EL. 890±

- 28 SM — Gravelly, silty medium to fine SAND (FILL)
- Silty, gravelly SAND with angular rock fragments
- 105 GM — Silty, sandy GRAVEL with angular rock fragments (TILL)
- Silty, sandy GRAVEL
- El. 882±
- GNEISS, granitic, dark gray, hard generally fresh. Pegmatite 14.0' to 17.4'. Scattered zones of biotite schist. Weathered high angle seam from 9.0' to 12.7' foliation dips from 45° to 90°.
- El. 862±

FD-3
4 NOV 1957
EL 945±

- Shoveled — Forest litter & TOPSOIL
- 20 ML — Fine sandy SILT with hair roots
- 70 SM — Fine sandy SILT with rock frags
- 380 GM — Silty, fine SAND
- Silty, sandy GRAVEL with rock fragments (TILL-LIKE)
- El. 931±
- GNEISS, granitic, pinkish gray, hard, coarse-grained, generally fresh. Scattered granite zones. Biotite concentrations 15.6' to 16.6'. Mud-filled, weathered zones 9.2' to 9.7'. Weathered horizontal and 45° joints at 17.0', 19.2' to 19.6', 23.0', 25.5' and high angle joint from 27.0' to 27.9'. Foliation generally vertical and contorted.
- El. 918±

Lost 100 % drill water below 13.0'.

FD-4
6 NOV 1957
EL. 900±

- TOPSOIL
- 5 SM — Silty, medium to fine SAND
- Gravelly SAND
- 95 SP — Gravelly, medium to fine SAND
- 600 — El. 897±
- GNEISS, granitic, pink and gray, hard, generally coarse-grained with scattered fine-grained granitic and schistose phases: Weathered and broken in schistose zone from 19.8' to 26.0'. Foliation variable but generally vertical.
- El. 864±

Lost 100 % drill water below 25.0'.

FD-5
18 MAY 1964
EL. 953.0

- Forest litter
- 56 — Silty medium to fine SAND with organic material
- 132 SM — Gravelly, silty, medium to fine SAND with cobbles (TILL)
- 60 — Silty, gravelly SAND with cobbles
- Weathered ROCK
- El. 941.8
- GNEISS, granitic, pink and gray, hard coarse grained. Weathered along occasional joints and foliation planes to 22.0'. Badly weathered and broken along closely spaced high angle and 30° joints below 22.0'. Mud-filled seam at 29.5' and fragment faces indicate mud in numerous weathered joints. Foliation dips at approximately 60° but is obscure and variable below 21.0'
- El. 920.0

Lost 30% drill water to 16.0' and 100% below.

FD-6
20 MAY 1964
EL. 952.6

- Forest litter
- 9 ML — Medium to fine sandy SILT with organics
- SM
- 143 SM — Gravelly, silty medium to fine SAND with trace of organics (TILL)
- 45 — Gravelly, silty medium to fine SAND (TILL)
- Silty, gravelly SAND (TILL)
- 120 — Gravelly, silty, medium to fine SAND (TILL)
- Gravelly, silty SAND
- El. 937.2
- GNEISS, granitic, pink, hard, coarse-grained, fresh. Slightly weathered on occasional 60° joints. Foliation obscure and variable.
- El. 917.2

Lost 20% drill water to 17.7' Lost 100% below

FD-7
22 MAY 1964
El. 929.4

- Forest litter and TOPSOIL
- 8 SM — Gravelly, silty medium to fine SAND with cobbles and organics
- 70 SM — Silty, gravelly SAND
- Gravelly, silty SAND (TILL)
- El. 921.4
- GNEISS, granitic, pink, hard, coarse-grained, fresh, weathered along 45° and 70° joints from 8.0' to 9.0', 9.7' to 10.3', 22.7' to 23.7' and 26.4' to 27.4'. Slightly weathered along scattered low angle joints throughout. Foliation variable but generally very steep to vertical.
- El. 901.4

Lost 100% drill water below 8.3'.

FD-8
26 MAY 1964
El. 962.2

- TOPSOIL
- 24 SM — Gravelly, silty fine SAND with cobbles and organics
- 81 SM — Gravelly, silty SAND
- GM — Silty, Sandy GRAVEL (TILL)
- Gravelly, silty SAND (TILL)
- GM — Silty, sandy GRAVEL
- 89 SM — Silty, gravelly SAND
- 98 GM — Silty, sandy GRAVEL
- NR
- El. 943.0
- SCHIST, quartz-biotite. Pegmatite from 31.0' to 34.4' and 35.3' to 37.0'. Numerous granitic stringers throughout. Foliation dips generally vertical to 70°.
- El. 922.2

FD-9
1 JUNE 1964
El. 947.5

- Forest litter
- 2 — Gravelly, silty medium to fine SAND with organics
- Silty, gravelly SAND
- 94 SM — Gravelly, silty SAND (TILL)
- 85 SM — Silty, gravelly SAND (TILL)
- Silty, sandy GRAVEL (TILL)
- Gravelly, silty SAND (TILL)
- El. 930.4
- GNEISS, granitic, pink, hard, coarse-grained, fresh. Biotite occures in thick foliation. Joints dip at 60° and 70°. Foliation variable and obscure.
- El. 910.4

Lost 20% drill water to 20.8' and 100% below.

FD-10
28 MAY 1964
El. 919.4

- Forest litter
- 3 SM — Gravelly, silty SAND with cobbles and organics
- 52 GM — Silty, sandy GRAVEL
- El. 912.0
- GNEISS, granitic, pinkish gray, hard, coarse-grained, fresh. Slightly weathered along closely-spaced joints. Dip of foliation variable.
- SCHIST, biotite, black, hard, coarse-grained, fresh. Slightly weathered along numerous high and low angle joints. Foliation obscure.
- GNEISS, granitic, light gray, hard, fine-grained, fresh. Scattered schist stringers. Foliation dips at approximately 70°.
- El. 892.0

Lost 20% drill water to 8.3' and 100 % below.

FD-11
3 JUNE 1964
El. 886.5

- TOPSOIL
- 12 SM — Fine, sandy SILT with organics
- SP-SM — Stratified silty fine SAND and CLAY with organics
- 34 SM — Silty, medium to fine SAND
- ML
- 51 SP-SM — Silty, medium to fine SAND with trace of gravel
- 44 ML — Gravelly, silty SAND
- 23 SM — Medium to fine SAND
- Silty, fine SAND with 1" strata of fine sandy SILT
- Fine, sandy SILT
- Silty, medium to fine SAND
- Fine, sandy SILT
- Medium to fine sandy SILT
- Silty, medium to fine SAND
- Gravelly, silty SAND (TILL-LIKE)
- El. 861.9
- GNEISS, granitic, light gray, hard, coarse-grained, fresh. Scattered pegmatite stringers. Slightly weathered along occasional 30° and 60° joints. Mud-filled weathered seam at 36.2'. Foliation obscure and variable.
- El. 841.9

FD-12
3 JUNE 1964
El. 909.0

- Forest litter
- 18 SM — Gravelly, silty medium to fine SAND with organics
- SP
- 52 SM — Silty, gravelly medium to fine SAND
- Silty, medium to fine SAND with trace of gravel
- 25 — Silty, medium to fine SAND with pockets of clay
- 90
- NR
- 45 NR — Weathered Rock
- NR — El. 882.4
- 320
- GNEISS, granitic, dark gray, hard. Coarse-grained to 34.5'. Fine-grained below. Weathered along numerous horizontal, 45° and 60° joints to 34.5'. Weathered zone 32.8' to 33.2' and slightly weathered on 45° joints at 36.2', 37.1' and 37.5'. Foliation dips at approximately 80°.
- El. 863.6

FD-13
5 JUNE 1964
El. 885.9

- TOPSOIL
- 90 — Silty, medium to fine SAND with organics
- 46 SP-SM — Silty, gravelly SAND
- Gravelly, silty medium to fine SAND
- 26 — Silty, medium to fine SAND
- 30 — Gravelly, silty medium to fine SAND
- 30 — Silty, gravelly medium to fine SAND
- Silty, medium to fine SAND
- El. 859.7
- GNEISS, granitic, light and dark, hard, coarse-grained, fresh. Weathered along numerous, closely-spaced joints and foliation planes to 33.0' and on scattered joints throughout. Felted biotite occurs locally. Foliation generally variable and obscure.
- El. 839.7

FD-14
5 JUNE 1964
El. 892.2

- Forest litter and TOPSOIL
- 33 — Silty, medium to fine SAND with cobbles and organics
- 33 ML-CL — Silty, gravelly medium to fine SAND
- 97 SM — Gravelly, silty medium to fine SAND
- 56 SM — Gravelly, sandy clayey SILT with cobbles (TILL)
- Gravelly, silty clayey SAND (TILL)
- Silty, medium to fine SAND with trace of gravel (stratified)
- Gravelly, silty medium to fine SAND (TILL)
- El. 875.0
- GNEISS, granitic, light gray, hard coarse-grained, generally fresh. Pegmatite from 26.6' to 27.2'. Weathered along numerous joints to 29.0'. Weathered zone with mud-filled seams from 24.6' to 25.0'. Joints dip at 60°, 45° & 60°. Foliation obscure and variable.
- El. 855.0

FD-15
10 JUNE 1964
El. 889.4

- TOPSOIL
- 9 — Silty, medium to fine SAND with organics
- 21 SM — Silty, fine SAND with organics
- 28 — Silty, medium to fine SAND with cobbles
- 30 — Silty, medium to fine SAND
- 45 — Gravelly, silty medium to fine SAND
- Silty, gravelly SAND
- El. 864.4
- GNEISS, granitic, dark gray, hard, coarse-grained, fresh. Pegmatite from 34.0' to 36.0', 43.6' to 44.3' and scattered throughout. Slightly weathered along numerous, closely-spaced joints to 35.0'. Joints generally horizontal and 30°. Foliation obscure and variable.
- El. 844.4

Lost 100 % drill water at 41.2'.

FD-16
16 JUNE 1964
El. 891.2

- TOPSOIL
- 9 — Silty, medium to fine SAND with organics
- 51 SM — Silty, medium to fine SAND
- 28 — Silty, gravelly SAND
- 52 — Silty, medium to fine SAND with trace of gravel
- Silty, fine SAND
- 64 SM — Silty, gravelly SAND
- Silty, fine SAND
- Gravelly, silty fine SAND
- Gravelly, silty SAND
- Silty, medium to fine SAND and weathered rock
- El. 865.0
- GNEISS, granitic, pink and gray, hard, coarse-grained, generally fresh. Shattered and weathered along closely-spaced high angle joints from 48.0' to 55.0'. Slightly weathered on scattered high and low angle joints throughout. Foliation dip variable and obscure.
- No Recovery 31.2' to 38.3'.
- El. 828.2

FD-17
18 JUNE 1964
El. 886.2

- Forest litter and TOPSOIL
- 6 SM — Silty, medium to fine SAND with cobbles and organics
- 130 — Silty, medium to fine SAND
- Rock fragments
- El. 876.9
- GNEISS, granitic, light and dark gray, hard, coarse-grained, fresh. Slightly weathered occasional foliation planes and high angle joints. Foliation variable but generally dips steeply.
- El. 856.9

Lost 100 % drill water throughout.

FD-18
22 JUNE 1964
El. 894.4

- TOPSOIL
- 14 — Gravelly, silty SAND with organics and strata of fine sandy silt
- 43 — Gravelly, silty SAND with strata of fine sandy silt
- 52 — Silty, gravelly medium to fine SAND
- 38 SM — Gravelly, silty SAND
- 21 — Silty, medium to fine SAND
- 65 — Gravelly, silty medium to fine SAND (TILL)
- 124 — Gravelly, clayey SAND (TILL)
- NR
- Silty, gravelly medium to fine SAND (TILL)
- El. 862.2
- GNEISS, granitic, dark gray, hard, coarse-grained, generally fresh. Quartz-mica schist from 36.0' to 38.0'. Recemented breccia at 42.4'. Slightly weathered on occasional high and low angle joints. Weathered zones 47.2' and 50.0'. Foliation generally obscure and variable.
- El. 842.2

Lost 10% drill water throughout.

DEPTH IN FEET

LEGEND FOR GRAPHIC LOGS

- FD — Foundation Test Boring
- BO — Borrow Test Boring
- BT — Borrow Test Pit
- Subsurface water level in boring at time of exploration.
- Range of subsurface water during period of observation.
- SP — Group letter symbol according to Unified Soil Classification System.
- NR — No recovery or unsatisfactory soils samples recovered.
- NS — Not sampled. Hole advanced by core-drilling, blasting and/or wash boring due to operational difficulty.
- Bottom of observation well.
- CD — Sampling in overburden by Core-drill method.
- 35 — Blows per foot of penetration considered most representative for each sample drive using a 300 or 350 pound hammer with a free fall of about 18" on a standard 5 foot, solid sample spoon with a beveled, sharpened drive shoe.
- * — Blow count not recorded or not considered representative.
- Cobble or boulder (Core drilled)
- Cobbles or boulders, continuous or nested (Core-drilled and/or blasted and chopped)
- El. 861.0 — Elevation of rock surface
- Rock symbol

Core Recovery (Usually 2⅛" diameter)

- 0 - 25 %
- 25 - 50 %
- 50 - 75 %
- 75 - 90 %
- 90 - 100 %
- El. 841.0 — Elevation bottom of exploration

NOTES

Elevations refer to Mean Sea Level

For location of explorations see Plate 6-2

REVISION	DATE	DESCRIPTION	BY

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS

DES. BY H.A.V. | DR. BY R.D.B. | CK. BY R.C.G.

SUBMITTED — CHIEF, GEOLOGY SECTION

CHIEF, F & M BRANCH — REVIEWED — PROJECT ENGINEER

APPROVED — C. CHIEF DESIGN BRANCH

CONNECTICUT RIVER FLOOD CONTROL
SUCKER BROOK DAM
RECORD OF FOUNDATION EXPLORATIONS
NO. 1

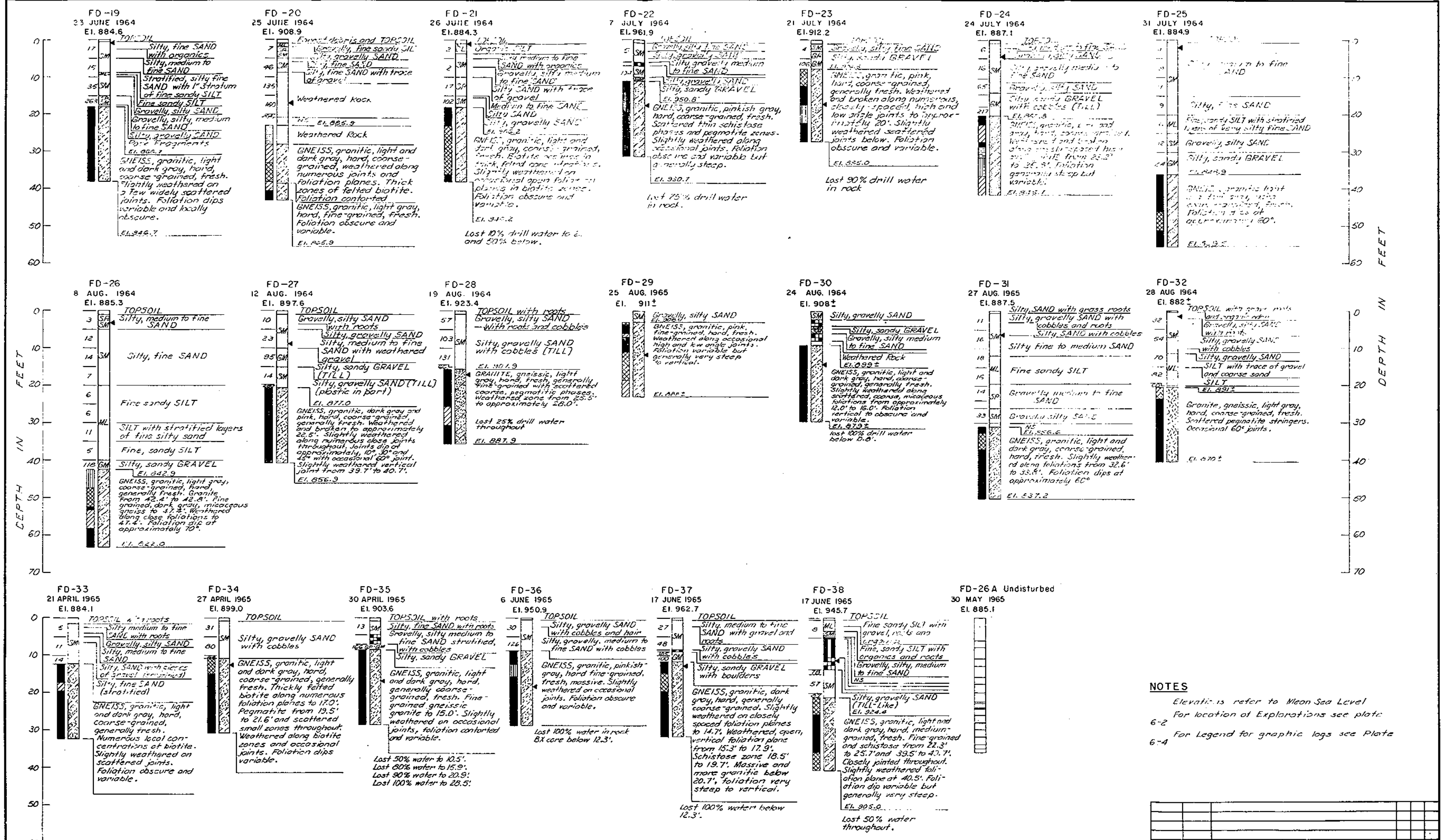
SUCKER BROOK — CONNECTICUT

APPROVED — DATE — CHIEF, ENGINEERING DIVISION

SCALE — SPEC. NO. CIV. ENG.-19-016 — DRAWING NUMBER

SHEET

PLATE 6-4



REVISION	DATE	DESCRIPTION	BY

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS

DES. BY H.A.V. DR. BY R.D.B. CK. BY R.C.G.

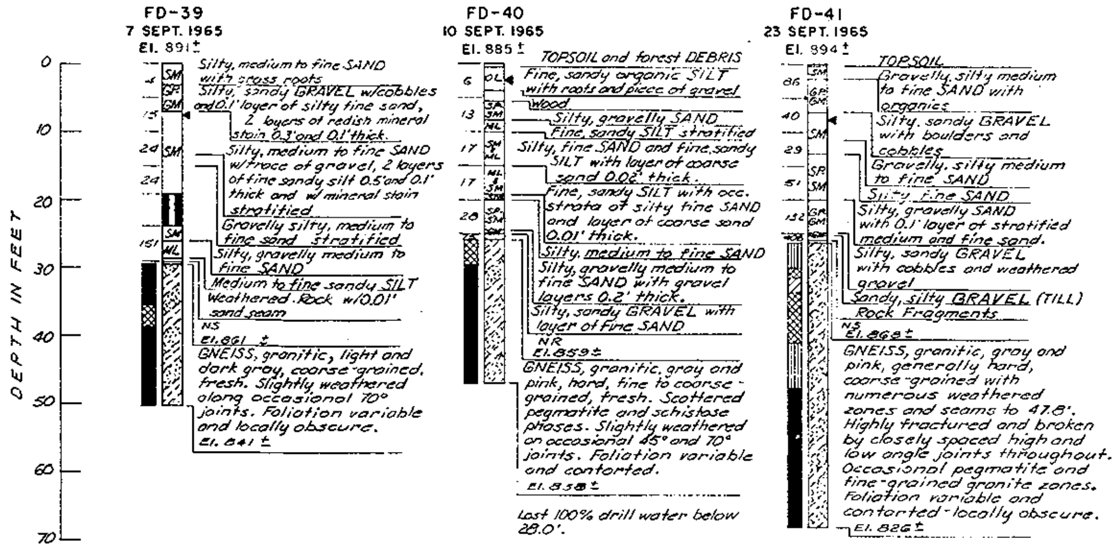
CONNECTICUT RIVER FLOOD CONTROL
SUCKER BROOK DAM
RECORD OF FOUNDATION EXPLORATIONS
NO. 2

SUCKER BROOK CONNECTICUT

SUBMITTED: CHIEF, GEOLOGY SECTION — CHIEF, F&M BRANCH
REVIEWED: PROJECT ENGINEER
APPROVED: CHIEF, DESIGN BRANCH
APPROVED — DATE — CHIEF, ENGINEERING DIVISION
SCALE — SPEC. NO. CIV. ENG.-19-016
DRAWING NUMBER
SHEET

CORPS OF ENGINEERS

U. S. ARMY



NOTES

Elevations refer to Mean Sea Level.
For location of explorations see Plate 6-2
For legend for graphic logs see Plate 6-4

REVISION	DATE	DESCRIPTION	BY

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS

DES. BY H.A.V. | DR. BY R.D.B. | CK. BY R.C.G.

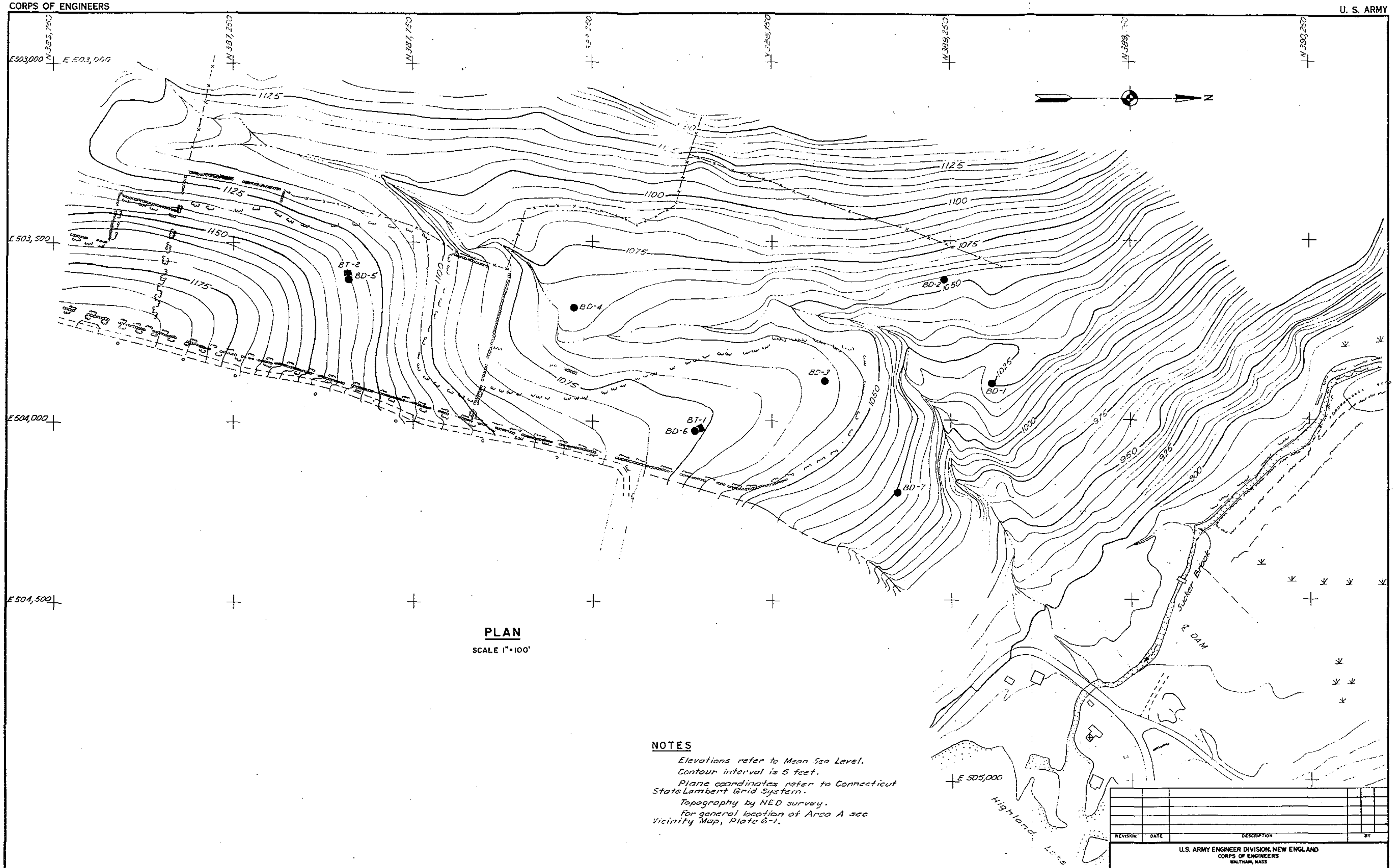
SUBMITTED
CHIEF, GEOLOGY SECTION
CHIEF, F&M BRANCH
REVIEWED
PROJECT ENGINEER
APPROVED
CHIEF, DESIGN BRANCH

CONNECTICUT RIVER FLOOD CONTROL
SUCKER BROOK DAM
RECORD OF FOUNDATION EXPLORATIONS
NO. 3

SUCKER BROOK CONNECTICUT

APPROVED
CHIEF, ENGINEERING DIVISION
DATE

SCALE
SPEC. NO CIV. ENG.-19-016
DRAWING NUMBER
SHEET



NOTES

Elevations refer to Mean Sea Level.

Contour interval is 5 feet.

Plane coordinates refer to Connecticut State Lambert Grid System.

Topography by NED survey.

For general location of Area A see Vicinity Map, Plate 6-1.

LEGEND

BD	●	*Borrow Test Boring*
BT	■	*Borrow Test Pit*

REVISION	DATE	DESCRIPTION	BY

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

DES. BY H.A.V.	DR. BY R.D.B.	CK. BY R.C.G.

SUBMITTED ______ CHIEF, GEOLOGY SECTION

______ CHIEF, F & M BRANCH

REVIEWED ______ PROJECT ENGINEER

APPROVED ______ CHIEF, DESIGN BRANCH

CONNECTICUT RIVER FLOOD CONTROL

SUCKER BROOK DAM

PLAN OF BORROW EXPLORATIONS AREA A

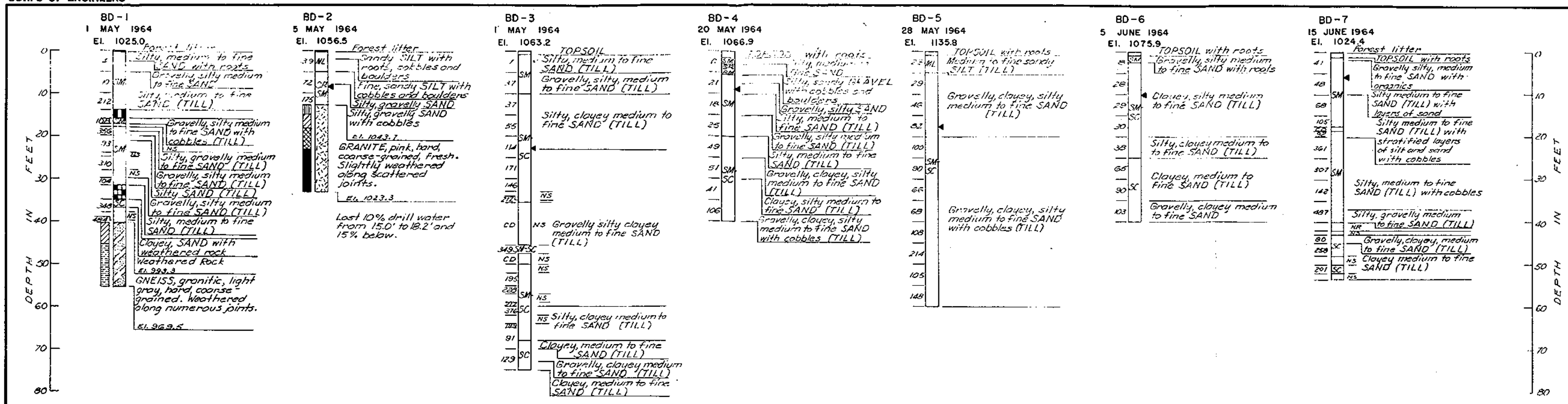
SUCKER BROOK — CONNECTICUT

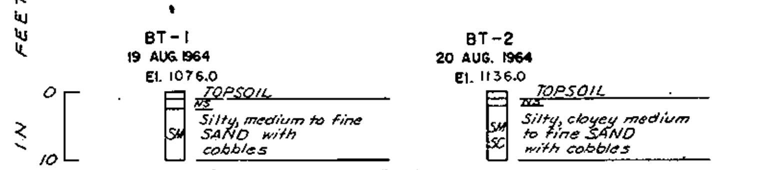
APPROVED ______ CHIEF, ENGINEERING DIVISION — DATE ______

SCALE 1" = 100' — SPEC. NO CIV. ENG.-19-016

DRAWING NUMBER

SHEET





PIT DIMENSIONS 10.0'x5.0'x10.0'

Cobbles and Boulders

4" - 6" = 200
6" - 18" = 5
Over 18" = 1

PIT DIMENSIONS 10.0'x5.0'x10.0'

Cobbles and Boulders

4" - 6" = 230
6" - 18" = 6
Over 18" = 2

NOTES

Elevations refer to Mean Sea Level.
For location of explorations see Plate 6-7.
For legend for graphic logs see Plate 6-4.

REVISION	DATE	DESCRIPTION	BY

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS

DES. BY H.A.V. | DR. BY R.D.B. | CK. BY R.C.G.

SUBMITTED — CHIEF, GEOLOGY SECTION — CHIEF, F&M BRANCH
REVIEWED — PROJECT ENGINEER
APPROVED — CHIEF, DESIGN BRANCH

CONNECTICUT RIVER FLOOD CONTROL

SUCKER BROOK DAM

RECORD OF BORROW EXPLORATIONS

SUCKER BROOK CONNECTICUT

APPROVED — CHIEF, ENGINEERING DIVISION — DATE

SCALE | SPEC. NO CIV. ENG.-19-016

DRAWING NUMBER

SHEET

PLATE 6-8